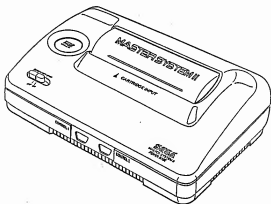


Sega Master System II

SERVICE MANUAL



APRIL, 1991
SEGA ENTERPRISES, LTD.
OVERSEAS CONSUMER PRODUCTS DIVISION

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1. PRODUCT NUMBER AND COLOR SPECIFICATIONS

<u>Territory</u>	<u>Model No.</u>	<u>Color Format</u>	<u>System</u>	<u>RF Modulator</u>	<u>Channel</u>
America	MK-3008	NTSC	M	200-5118-01 or 200-5115	3/4
Canada	MK-3008-22	PAL	B (VV)	200-5194-02	3/4
Australia	MK-3008-03	PAL	B (VE)	200-5198	0/1
N. Zealand	MK-3008	PAL	D	200-5139	2/3
China	MK-3008-15	PAL	G	200-5086-02	3/4
Germany	MK-3008-18	PAL	G	200-5086-02	36
France	MK-3008-09	PAL	RGB	NONE	-

2. AC ADAPTOR SPECIFICATIONS

<u>Territory</u>	<u>Parts Model No.</u>	<u>Diagram Number</u>	<u>Voltage/ Number</u>	<u>Plug Frequency</u>	<u>Type</u>
America	MK-3008	400-5115	H-0246	AC120V \pm 10%/ 60Hz	A Type
Canada	MK-3008-22	400-5123	H-0249	AC120V \pm 10%/ 60Hz	A Type
Australia	MK-3008-03	400-5060	H0133	AC240V \pm 10%/ 50Hz	S Type
N. Zealand	MK-3008-04	400-5060	H-0133	AC240V \pm 10%/ 50Hz	S Type
China	MK-3008-15	400-5093-91	H-0158-01	AC220V \pm 10%/ 50Hz	A Type
Germany	MK-3008-18	400-5126		AC220V \pm 10%/ 50Hz	C Type

3. PRODUCT DIMENSIONS AND WEIGHT

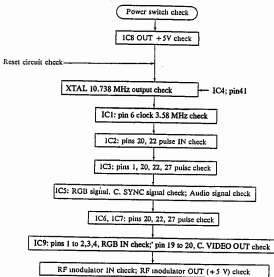
Main Unit Dimensions	256 (W) x 172 (D) x 81.5 (H) mm
Main Unit Weight	790 g
Packed Dimensions	360 (W) x 216 (W) x 125 (H) mm
Packed Weight	1.7 kg.
Master Carton Dimensions (6 pcs./carton)	450 (W) x 400 (D) x 390 (H) mm
Master Carton Weight	11.5 kg. (0.072 m ³)

4. ELECTRICAL SPECIFICATIONS

Power	AC 220V or 240V, 50Hz
CPU	Z-80A 3.58 MHz
RAM	64 Kbit
V-RAM	128 Kbit
ROM	1Mbit
Scrolling Screen	256 x 192 dot 32 colors displayed from a palette of 64
Sprite Screen	64 sprites of 8 x 8 dot or 8 x 16 dot on screen 16 colors displayed from a palette of 64
Character Patterns	Maximum of 448 types
Scrolling Directions	Horizontal, Vertical, Diagonal
Sound	Three types plus noise

REPAIR PROCEDURES




1. FLOWCHART FOR TROUBLESHOOTING FAULT LOCATIONS



2. MAIN UNIT (POWER BASE)

(A). Servicing the Main Unit (Power Base)

NS-10-9s

Parts Test Procedure	Fault Location	Symptoms
<p>1. IC 8 (LM7805) power check.</p> <p>(1) INPUT DC 9V</p> <p>(2) OUTPUT $V_{cc}=DC5V$</p>	<p>1. IC8 (LM7805) faulty.</p> <p>2. Soldering Faulty.</p> <p>3. Short Circuit</p> <p>4. Printed circuit board (PCB) pattern is cut.</p> <p>5. POWER switch is faulty.</p> <p>6. Heat sink attachment faulty.</p>	<p>1. LED doesn't light.</p> <p>2. No picture</p>
<p>2. Power check of ICs</p> <p>(1) Is V_{cc} 5V power present?</p>	<p>1. PCB pattern is cut.</p> <p>2. Soldering is faulty.</p>	<p>1. No picture.</p> <p>2. Screen is black.</p>
<p>3. Is reset circuit operating?</p> <p>(1) Use tester to measure voltage of JR. Should be 0-3.6 V (slowly rises).</p>	<p>1. Capacitor C18 faulty.</p> <p>2. Soldering faulty.</p> <p>3. Resistor R4 faulty.</p>	<p>1. No picture.</p> <p>2. Screen is black.</p>
<p>4. Is oscillator circuit working?</p> <p>(1) Pin 41 of IC4: AC 6 Vp-p; 10.738635 MHz \pm 100Hz</p>  <p>(2) Pin 33 of IC 5 clock 3.579545 MHz \pm 30 Hz</p>  <p>225.6 ns.</p> <p>(3) Pin 42 of IC4 clock: 4.43361875 MHz \pm 30Hz</p>  <p>279 ns.</p>	<p>1. OSC (53M) faulty</p> <p>2. Soldering faulty</p> <p>3. PCB pattern is cut</p> <p>4. IC 4 is faulty</p> <p>5. Frequency exceeds allowable deviation.</p>	<p>1. No picture</p> <p>2. Color may be monochromatic</p>

<p>5. Check connectors</p> <p>(1) Make visual check of connector pins.</p> <p>(2) Check for faulty soldering connections</p>	<p>1. Broken from excessive weight.</p> <p>2. Soldering faulty.</p> <p>3. PCB pattern is cut.</p> <p>4. Terminal plugs are dirty.</p>	<p>1. No picture</p> <p>2. Picture is monochromatic.</p> <p>3. Characters are unnatural.</p> <p>4. Controls do not respond properly.</p>
<p>6. Check button switches.</p> <p>(1) Check power button switch.</p> <p>(2) Check Pause button switch</p>	<p>1. Switch is loose.</p> <p>2. Soldering faulty.</p> <p>3. PCB pattern is cut.</p> <p>4. Switch is short-circuited.</p> <p>1. Soldering faulty</p> <p>2. PCB pattern is cut</p> <p>3. Blade is not parallel with circuit board.</p> <p>4. Switch is short-circuited.</p>	<p>1. No power voltage present.</p> <p>2. LED doesn't light.</p> <p>3. No picture.</p> <p>4. Reset occurs spontaneously.</p> <p>5. Characters suddenly appear abnormal.</p> <p>1. Pause doesn't operate properly.</p>
<p>7. Check RF modulator</p> <p>(1) Is OUT +5V present?</p> <p>(2) Check channel selector: Are CH3 and CH4 ok?</p>	<p>1. PCB pattern is cut.</p> <p>2. Soldering is faulty.</p> <p>3. RF modulator is faulty.</p> <p>4. IN event IC9 is faulty.</p> <p>1. RF modulator is faulty.</p>	<p>1. No picture</p> <p>2. Picture appears dirty.</p> <p>3. No sound.</p> <p>4. Much audio noise.</p> <p>1. CH3 appears, but not CH4.</p> <p>2. CH4 appears, but not CH3.</p>

(B) Possible symptoms for each fault location

Fault Location (Contents of malfunction)	Symptom
1. When IC1 (CPU) is faulty.	1. System doesn't operate at all. No picture at all.
2. When IC2 (OS ROM) is faulty.	1. Since this is the program which operates the system, no picture will appear. 2. Depending on the case, a mosaic pattern may appear.
3. When IC3 RAM is faulty.	1. Since this is the unit that temporarily records data, no picture will appear. 2. Depending on the case, a picture may appear, but it is easily distorted.
4. When IC4 is faulty.	1. Since this IC emits several control signals, no picture will appear. 2. Controller may not respond properly. 3. Pause, reset may not respond properly. 4. If no oscillation is present, clock 3.58 MHz is not produced, with result that system does not operate at all; no picture will appear.
5. When IC5 is faulty.	In addition, several control signals are involved; if fault is present, system will not operate and no picture will appear. 1. Even if a picture appears, characters may be distorted. 2. Colors may be improper. 3. Sound may appear alone without picture. 4. Picture may appear alone without sound.
6. When IC6, IC7 are faulty.	1. Since these parts are responsible for temporarily storing color data, picture may not appear. 2. Even if picture appears, colors may be improper. 3. Characters may be distorted. 4. Picture may be move sluggishly or jerkily.
7. When IC8 is faulty.	1. Since this is +5 V stabilized current, if malfunction is present, uniform +5 V is not present; system will not operate and no picture will appear. 2. LED doesn't light.
8. When IC9 is faulty.	1. Since this part converts the RGB signal to composite mode, a malfunction will result in no picture. 2. Even if a picture appears, color may be abnormal.

(C). In the event picture appears alone without sound

Service Procedures	Fault Location
1. Is audio signal output from pin 15 of IC3? (1) MAX 300 mVp-p (2) 20 Hz-20kHz	1. Soldering is faulty. 2. PCB pattern is cut. 3. Q48, Q49, R47 are faulty 4. R46 is faulty. 5. IC5 is faulty. 6. RF modulator is faulty.

(D) In event picture is not present.

Service Procedures	Fault Location
1. Is video signal present at pin 3 of RF modulator? 2. Is video signal output from pins 19 and 20 of IC9? 3. Is RGB signal present at pins 1,2,3, and 4 of IC9?	1. C38, R29 is absent or faulty. 2. Soldering faulty. 3. PCB pattern is cut. 4. RF modulator is faulty (when picture is present on RF). 5. IC9 is faulty. 6. Peripheral parts around IC9 are faulty.

1. 10 2. 5V
 3. 5V
 4. 3 2V
 5. 4 2-5V

1. 10 2. 5V 3. 5V

(E) In event controls do not respond normally

Symptom(s)	Fault Location(s)
<ul style="list-style-type: none">1. Game doesn't start.2. Button may not respond when pressed.3. Absolutely no response at all.	<ul style="list-style-type: none">1. CON2 or CON3 faulty (disconnection)2. Soldering faulty.3. PCB pattern is out.4. IC is faulty.5. EMI filter is faulty.6. Resistor 330 ohm is faulty.7. Check for continuity between CON2 and CON3 terminals and terminals of IC4.
<ul style="list-style-type: none">4. Demonstration screen doesn't appear.5. Switch stays depressed in middle of game.6. Switch remains fixed in one direction.7. Starts by itself.	<ul style="list-style-type: none">1. CON2 or CON3 is faulty (short-circuited)2. Soldering is short-circuited.3. PCB pattern is short-circuited.4. IC4 is faulty.

3. SOFTWARE

Software (Card or Cartridge) Malfunctions

Symptoms	Fault Location
1. No picture. Picture remains monochromatic. Picture is mosaic pattern.	1. Connector (50 pin) is dirty, disconnected, or other connection fault. 2. Soldering faulty. 3. Short-circuit. 4. Capacitor is missing or faulty. 5. IC is damaged from overheating or static electricity.
2. Characters are disrupted suddenly in middle of game. Reset occurs spontaneously in middle of game. Other abnormal symptoms appear in middle of game.	1. Connection fault at connector (50 pin). 2. Soldering faulty. 3. Capacitor is missing or faulty. 4. IC runaway overheating. 5. In the case of number 4 above, the problem may be rectified by adding a capacitor 100PF—180PF at A13 (address 13). 6. IC is faulty.

4. AUTO SWITCHBOXES

Symptoms	Fault Location
1. No picture. Game picture doesn't appear. TV picture doesn't appear.	1. Cable is cut or shorted. 2. Plug is faulty. 3. Soldering is faulty on cable connection terminal. 4. PCB pattern is broken or interrupted. 5. Auto-switcher unit is faulty.
2. Sound is bad. Much audio noise.	1. Cable is cracked. 2. Soldering faulty. 3. Plug connection is faulty. 4. Auto switcher is faulty (adjustment faulty).

5. CONTROLLER RELATED

Control pads

Symptoms	Fault Location
1. Controller does not operate. Doesn't move as it should. Game doesn't start.	1. Cable is cut. 2. Faulty connection at connector. 3. PCB pattern is cut. 4. Conductive rubber is faulty. 5. Soldering faulty.
2. Moves spontaneously by itself. Switch remains depressed in one direction.	1. Cable is shorted. 2. Solder is greasy. 3. Conductive rubber is stuck.

SEGA

IC BD M4JIC PAL

POWER SW

PAUSE SW

μ PD4168-15

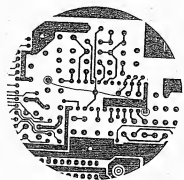
μ PD9004G

μ PD6500SC-114

μ PD4168-15

- 271 EM17
- 222 EM18
- 222 EM19
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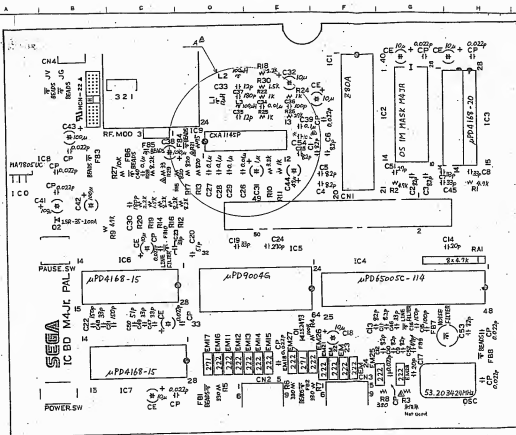
Land near CX41145 is the positive side.



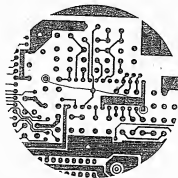
DETAILED DRAWING
(View from soldering side)

Connect C39 and GND for IC9 with jumper wire as above.

MACHINE 機番		SUB-ASST 組番	
		610-512	
ALTERATIONS 改訂			
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Land near C1145
is the positive
side.



DETAILED DRAWING
(View from soldering side)

Connect C39 and GND for
IC9 with jumper wire as
above.

MACHINE 機台		SUBASSEMBY 組立台	
		670-8146	
ALTERATIONS 改訂			
A	NO.	DATE	BY
1	10	10/10/80	W. J. H.
2	10	10/10/80	W. J. H.
3	10	10/10/80	W. J. H.
4	10	10/10/80	W. J. H.
5	10	10/10/80	W. J. H.
6	10	10/10/80	W. J. H.
7	10	10/10/80	W. J. H.
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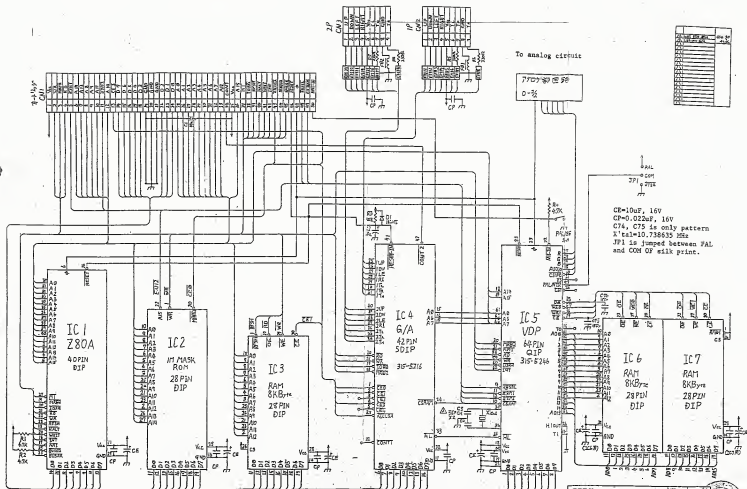
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SCALE		SCALE		SCALE	
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BY		BY		BY	
W. J. H.		W. J. H.		W. J. H.	
CHECKED		CHECKED		CHECKED	
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APPROVED		APPROVED		APPROVED	
10/10/80		10/10/80		10/10/80	
DESCRIPTION		DESCRIPTION		DESCRIPTION	
ZC BD M4JR PAL-B (VE)		ZC BD M4JR PAL-B (VE)		ZC BD M4JR PAL-B (VE)	
PART NO. 67-8289		PART NO. 67-8289		PART NO. 67-8289	

Parts List For Master System II PAL Version

LOCATION	PART NUMBER	DESCRIPTION
AC ADAPTOR	400-5130	AC ADAPTOR AC240V/DC9V 0.5A (Australia)
AC ADAPTOR	400-5126	AC ADAPTOR AC 220V/DC9V 0.5A (Europe)
AC ADAPTOR	400-5129	AC 240V/DC9V 0.5A (UK)
RF. MOD.	200-5091-A	RF MODULATOR UB 3622 (I-PAL)
RF. MOD.	200-5198	RF MODULATOR VE 3423 (B-PAL VE)
RF. MOD.	200-5086	RF MODULATOR UE 3622 (G-PAL)
	610-5127	ASSY CONTROL PAD 3020-03
	610-5128	ASSY RF SW BOX W/RF CABLE
	671-1215	SUPPORT BOARD MS2 MULTI
	601-6681	STYROFOAM MS2 MULTI L/R
	671-1155	BOXC MS2 BLACK MULTI
	671-1156	MA CTN MS2 MULTI
	672-0228	INSTR MANUAL M4 JR. MULTI
	253-6426-01	BOTTOM CASE M4 JR. BLACK PAL
	250-5185	TOP SHIELD M4 JR.
	250-5186	BOTTOM SHIELD M4 JR.
	253-6425	TOP CASE M4 JR. BLACK
	253-6352	DOOR M4 JR.
	253-6427	PAUSE SW MR JR. BLACK
	253-6428	POWER BUTTON M4 JR. BLACK
PCB	171-3922A	PC BD M4JR PAL
HOLDER	250-5187	HOLDER M4JR
CN1	209-5023	EDGE CONN 50P PSB4D25S-4R1
CN2	209-5017	D-SUB CONN 9P
CN3	209-5017	D-SUB CONN 9P
CN4	212-5004	PIN PLUG FOR DC/NP UC-0056 #1
POWER SW	509-5240-01	SLIDE SW HSW1699-01-010
PAUSE SW	509-5207	TACT SW SKEVAA
PAUSE SW	510-5019	TACTILE PUSH SW SKEVAA
IC1	315-0041	IC280A
IC2	MPR-12808	IC OS 1M MASK M4JR
IC3	315-0298	IC UPD4168C-20
IC4	315-5237	IC GA UPD65005C-114
IC5	315-5246	IC CUSTOM CHIP UPD9004G
IC6, IC7	315-0298-15	IC UPD4168C-15
IC8	313-0092	IC MA7805UC
IC9	313-5067	IC CXAT1145P
D1	481-0149-01	DIODE 1S2473
D2	481-5038-01	DIODE 1SR-35-100A
L1	180-5033	PEAKING COIL 12 UH
L2, L3	180-5032	PEAKING COIL 100UH
R1, R2	479-0472	RES 4.7 KOHM 1/6 W
R9	479-0472	RES 4.7 KOHM 1/6 W
R11, R22, R24, R25	479-0102	RES 1 KOHM 1/6 W
R4	479-0104	RES 100 KOHM 1/6 W

R5, R6	479-0331	RES	330 OHM	1/6 W
R7, R8	479-0331	RES	330 OHM	1/6 W
R10	479-0332	RES	3.3 KOHM	1/6 W
R12, R14, R16, R28	479-0822	RES	8.2 KOHM	1/6 W
R13, R15, R17	479-0821	RES	820 OHM	1/6 W
R18, R20, R29	479-0222	RES	2.2 KOHM	1/6 W
R19, R30	479-0152	RES	1.5 KOHM	1/6 W
R21	479-0202	RES	2 KOHM	1/6 W
R26	479-0273	RES	27 KOHM	1/6 W
R27	479-0103	RES	10 KOHM	1/6 W
C1, C2, C3, C4, C5, C6, C9, C10, C11, C12, C13, C25, C53	151-0126	CAP CER	82PF	50V
C7, C8, C19, C23, C45, C46, C47, C48, C49	151-0020	CAP CER	33PF	50V
C14, C17	151-0021	CAP CER	20PF	50V
C15	151-0002	CAP CER	100PF	50V
C16, C21, C22	151-0018	CAP CER RA	150PF	50V
C18, C32, CE1, CE2, CE3, CE4, CE5, CE6	150-0023	CAP E	10UF	16V
C20, C50	151-0072	CAP CER	51PF	50V
C24	151-0136	CAP CER	270PF	50V
C26, 34	151-0011	CAP CER	0.01 UF	50V
C27, C28, C29, C39, C40, C54	151-0060	CAP CER	0.1 UF	16V
C30	151-0075	CAP CER RA	180PF	50V
C31	150-0009	CAP E	1UF	50V
C33, C35	151-0190	CAP CER	12PF	50V
C36	151-0139	CAP CER RA	100PF	50V
C37	151-0172	CAP CER	180PF	50V
C38, C42, C43	150-0047	CAP E	100UF	10V
C41	150-0039	CAP E	100UF	16V
C44	150-0062	CAP E	47UF	10V
C51	151-0287	CAP CER	27PF	50V
C52	151-0079	CAP CER	47PF	50V
CP1, CP2, CP3, CP4, CP5, CP6, CP7, CP8, CP9, CP10, CP11, CP12, CP13	151-0170	CAP CER AX	0.022UF	16V
FB1, FB2, FB3, FB4, FB5, FB6, FB8, JV, JG	271-0005-1	BEADS INDUCTOR	FBA04VA600VB-00	
FB7	270-5027	LINE FILTER		
FB9, FB10	270-5035	LINE FILTER	FBR07HA121	

EM11, EM12, EM13, EM14, EM15, EM16, EM18, EM21, EM22, EM23, EM24, EM25, EM26, EM28	271-0007	EMI FILTER STX222MB
EM17, EM27	271-0006	EMI FILTER STB271KB
OSC	230-5058	OSC 53.263424M 20PPM
RA1	477-0005	RES PACK 8*4.7K (RA3-4728K)
GRS	601-0076	TML JNT CMPD 200G/TUBE (AMICOM)



SEGA ENTERPRISES, LTD.

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REV

IC BD M4 Jr. RGB

DESCRIPTION



Parts List For Master System II RGB Version

LOCATION PART NUMBER DESCRIPTION

	610-3127	ASSY CONTROL PAD 3020-03
	400-9048Y	AC ADAPTOR AC220V/DC9V 1A
	610-0130	RGB BOX FRANCE
	671-1213	SUPPORT BOARD MS2 MULTI
	601-6681	STYROFOAM MS2 MULTI L/R
	671-1133	BOX MS2 BLACK MULTI
	671-1136	MA CTN MS2 MULTI
	672-0228	INSTR MANUAL M4 JR. MULTI
	253-6426-02	BOTTOM CASE M4 JR. BLACK RGB
	250-3185	TOP SHIELD M4 JR.
	250-3186	BOTTOM SHIELD M4 JR.
	670-0835	SEAL SER. NO. M4 JR. RGB
	253-6425	TOP CASE M4 JR. BLACK
	253-6352	DOOR M4 JR.
	253-6427	PAUSE SW MR JR. BLACK
	253-6428	POWER BUTTON M4 JR. BLACK
PCB	171-3926A	PC BD M4JR VAI
CN1	209-3023	EDGE CONN 50P PSB4D23S-4R1
CN2, CN3	209-5017-01	D-SUB 9P ANGLE TYPE UC-0060 #2
CN4	221-3004	PIN PLUG FOR DC/NP UC-0056#1
CN5	212-5106	DIN CONN B-TYPE UC-0059#2
POWER SW	509-5240-01	SLIDE SW HSW1699-01-010
PAUSE SW	509-5207	TACT SW SKEVAA
PAUSE SW	510-5019	TACTILE PUSH SW SKEVAA
IC1	315-0041	IC Z80A
IC2	MPR-12808	IC OS 1M MASK M4 JR
IC3	315-0298	IC UPD4168C-20
IC4	315-3216 152277	IC CUSTOM CHIP G/A
IC5	315-3246	IC CUSTOM CHIP UPD9004G
IC6, IC7	315-0298-15	IC UPD4168C-15
IC8	313-0092	IC MA7805UC
D1	481-0149-01	DIODE 1S2473 RADIAL
D2	481-5038-01	DIODE 1SR-35-100A RADIAL
R1, R2	479-0472	RES 4.7 KOHM 1/6 W
R3	479-0104	RES 100 KOHM 1/6 W
R4	479-0472	RES 4.7 KOHM 1/6 W
R5, R6	479-0331	RES 330 OHM 1/6 W
R7, R8	479-0331	RES 330 OHM 1/6 W
R39	479-0152	RES 1.5 KOHM 1/6 W
R60, R61	479-0222	RES 2.2 KOHM 1/6 W
C1	150-0062	CAP E 47UF 10V
C2	150-0023	CAP E 10UF 16V
C3, C4	151-0279	CAP CER 56PF 50V
C50	150-0059	CAP E 100UF 16V
C51, C52	150-0060	CONN 0.22MF 16V

C53, C54	150-0047	CAP E	100UF	10V
C55	151-0060	CAP CER	0.1UF	16V
C61	151-0075	CAP CER KA	180PF	50V
C72	151-0159	CAP CER KA	100PF	50V
CP1, CP2, CP3, CP4, CP5, CP6, CP7, CP8, CP9,	151-0170	CAP CER AX	0.022UF	16V
CE1, CE2, CE3, CE4, CE5, CE6	150-0023	CAP E	10UF	16V
FB1, FB2, FB51, FB55, FB56, FB67, JV, JG, JPR, JPG, JPB, JPS,	271-0005-1	BEADS INDUCTOR FBA04VA000VB-00		
XTAL	230-0046-1	XTAL 10.738635		
EM11, EM12, EM13, EM14, EM15, EM16, EM18, EM21, EM22, EM23, EM24, EM25, EM26, EM28	271-0007	EMI FILTER	STX222MB	
EM17, EM27	271-0006	EMI FILTER STB271KB		
JP1	600-5061	JUMPER WIRE 5MM		
HOLDER	250-5187	HOLDER M4JR		
GR5	601-0076	TML JNT CMPD 200G/TUBE (AMICON)		
S-LOCK	090-0012	SCREW LOCK		
CN2L, CN2R, CN3L, CN3R	012-0306	TAP SCR PH 3*6		
7805-HOLDER	029-0214	S-TITE SCR PH M3*8		
CN1L, CN1R	048-0001	EYLET 3.5*7		
DINHOLDER	250-5013	DIN CONN HOLDER		